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REISSUE PATENT APPLICATION TRANSMITTAL

Address to: Assistant Commissioner for Patents Box Patent Application Washington, DC 20231	Attorney Docket No.	00-422RE
	First Named Inventor	LIEBERMANN
	Original Patent Number	5,982,853
	Original Patent Issue Date (Month/Day/Year)	11/09/99
	Express Mail Label No.	EL398545135US

APPLICATION FOR REISSUE OF: ☒ Utility Patent ☐ Design Patent ☐ Plant Patent
(check applicable box)

APPLICATION ELEMENTS

- ☒ * Fee Transmittal Form (PTO/SB/56)
(Submit an original, and a duplicate for fee processing)
- ☒ Specification and Claims (amended, if appropriate)
- ☒ Drawing(s) (proposed amendments, if appropriate)
(16)
- ☒ Reissue Oath / Declaration (original or copy)
(37 C.F.R. § 1.175)(PTO/SB/51 or 52)
- Original U.S. Patent
☒ Offer to Surrender Original Patent (37 C.F.R. § 1.178)
(PTO/SB/53 or PTO/SB/54)
or
☐ Ribboned Original Patent Grant
☐ Affidavit / Declaration of Loss (PTO/SB/55)
- Original U.S. Patent currently assigned?
☐ Yes ☒ No
(If Yes, check applicable box(es))
☐ Written Consent of all Assignees (PTO/SB/53 or 54)
☐ 37 C.F.R. § 3.73(b) Statement ☐ Power of Attorney

ACCOMPANYING APPLICATION PARTS

- ☒ Transfer drawings from Patent File
- ☐ Foreign Priority Claim (35 U.S.C. 119)
(if applicable)
- ☒ Information Disclosure Statement (IDS)/PTO-1449 ☒ Copies of IDS Citations (12)
- ☐ English Translation of Reissue Oath/Declaration
(if applicable)
- ☒ * Small Entity Statement filed in prior application
(PTO/SB/09-12) ☐ Status still proper and desired
- ☒ Preliminary Amendment
- ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
- ☐ Other:

* NOTE FOR ITEMS 1 & 11: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.37), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.38).

15. CORRESPONDENCE ADDRESS

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June 23, 2000

(Date of Deposit)
Nicole Porto

Name and Reg. No. of Attorney
Nicole Porto
Signature
June 23, 2000
Date of Signature

[illegible]

For : TELEPHONE FOR THE DEAF
AND METHOD OF USING SAME

PRELIMINARY AMENDMENT

Dear Sir:

In the above-identified reissue application, please amend as follows:

IN THE CLAIMS:

Prior to calculating the filing fee due, please amend the following claims:

Amend claims 1, 12, and 26 as follows:

1. (Amended) An electronic communications system for the deaf comprising:

(a) a video apparatus for visually observing the images of facial and hand and finger signing motions of a [deaf] person and converting the observed signing motions into digital identifiers;

converting the observed signing motions into digital identifiers;

- (b) translating said digital identifiers of said observed signing motions into words and phrases;
- (c) outputting said words and phrases in a comprehensible form to another person;
- (d) receiving speech from said another person;
- (e) translating said speech of said another person into signing motions; and
- (f) displaying said signing motions representing said speech to [said] a deaf person.

26. (Amended) An electronic communication system for the deaf comprising:

- (a) a video apparatus for visually observing the images of facial and hand and finger signing motions of a [deaf] person and converting the observed signing motions into digital identifiers;

claim 33, wherein said translating means includes artificial intelligence means for providing an analysis of the emotional content of said spoken words and wherein said system further comprises means for separately conveying said emotional content to said device utilized by said hearing impaired person.

40. An electronic communications system according to claim 33, wherein said device has means for converting textual material received from said translating means into reduced identifying pointers and for converting said reduced identifying pointers into animated images which portray in sign language the content of the spoken words and phrases.

41. An electronic communication system according to claim 33, wherein said device utilized by said hearing impaired person is located in a kiosk.

42. An electronic communication system according to claim 33, wherein said device utilized by said hearing impaired person comprises a portable transmitter/receiver.

43. An electronic communication system according to claim 33, wherein said device utilized by said hearing impaired person comprises a personal computer which includes a monitor.

44. An electronic communication system according to claim 43, wherein said personal computer further includes a video camera for capturing facial, hand, and finger signing motions generated by said hearing impaired person.

45. An electronic communication system according to claim 33, wherein said output means comprises means for transmitting said text via telephone lines and said device used by said hearing impaired person includes means for converting said transmitted text to animated images.

R E M A R K S

By the present amendment, claims 1, 12, and 26 have been amended to correct the defect set forth in the reissue Declaration. Additionally, new claims 33-45 have been added to the case. The new claims correct a defect in the original patent, which defect is also set forth in the Declaration in the above-identified newly filed reissue application.

An early action on the merits is hereby requested.

Should the Examiner believe an additional amendment is needed to place the case in condition for allowance, he is invited to contact Applicant's attorney at the telephone number listed below.

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The Commissioner is hereby authorized to charge \$609.00 to Deposit Account No. 02-0184 to cover the additional claim fee and the fee for filing the reissue application. Should the Commissioner determine that an additional fee is due, he is hereby authorized to charge said fee to Deposit Account No. 02-0184. A duplicate copy of this paper is enclosed herewith in connection with the deposit account charge.

Respectfully submitted,

RAIMON LIEBERMANN

By Barry L. Kelmacher
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Date: June 23, 2000

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EXPRESS MAIL NO.:
EL398545135US

TELEPHONE FOR THE DEAF AND METHOD OF USING SAME

CROSS REFERENCE TO RELATED APPLICATION

The present application is a continuation-in-part of our application Ser. No. 08/396,554 filed Mar. 1, 1995, now abandoned.

BACKGROUND OF THE INVENTION

The present invention relates to electronic apparatus for communication by the deaf, and, more particularly, to such apparatus which enables the deaf person to communicate through use of sign language.

Deaf people are employed in almost every occupational field. They drive cars, get married, buy homes, and have children, much like everyone else. Because of many inherent communication difficulties, most deaf people are more comfortable when associating with other deaf people. They tend to marry deaf people whom they have met at schools for the deaf or through deaf clubs. Most deaf couples have hearing children who learn sign language early in life to communicate with their parents. Many deaf people tend to have special electronics and telecommunications equipment in their homes. Captioning decoders may be on their televisions, and electrical hook-ups may flash lights to indicate when the baby is crying, the doorbell is ringing, or the alarm clock is going off.

However, deaf persons have substantial difficulties in communicating with persons at remote locations. One technique which is employed utilizes a teletype machine for use by the deaf person to transmit his message and also to receive messages, and the person with whom the deaf person is communicating also has such a teletype machine so that there is an effective connection directly between them. In another method, the deaf person utilizes a teletype machine, but the person who is communicating with the deaf person is in contact with a communications center where a person reads the transmission to the hearing person over the telephone and receives the telephone message from the hearing person and transmits that information on the teletype machine to the deaf person. Obviously, this teletype based system is limited and requires the deaf person to be able to manipulate a teletype machine and to understand effectively the written information which he or she receives on the teletype machine. Processing rapidly received written information is not always effective with those who have been profoundly deaf for extended periods of time. Moreover, a system based upon such teletype transmissions is generally relatively slow.

The widespread availability of personal computers and modems, has enabled direct communication with and between deaf persons having such computers. However, it is still required that the deaf person be able to type effectively and to readily comprehend the written message being received.

Deaf persons generally are well schooled in the use of finger and hand signing to express themselves, and this signing may be coupled with facial expression and/or body motion to modify the words and phrases which are being signed by the hands and to convey emotion. As used herein, "signing motions" include finger and hand motions, body motions, and facial motions and expressions to convey emotions or to modify expressions generated by finger and hand motions. A written message being received on a teletype machine or computer may not convey any emo-

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tional content that may have been present in the voice of the person conveying the message.

Profoundly deaf people communicate among themselves by this sign language on a face to face basis, and utilize a Tele-Typewriter (TTY) for telephone communication. The TTY itself leaves much to be desired, since their sign language is a modified syntax of the spoken language, resulting in a smaller vocabulary and lessened ease of reading printed text as a whole (e.g. definite and indefinite articles ["the", "a", "an"] are omitted most of the time and possessives and plurals are not usually distinguished).

When it comes to communication of profoundly deaf persons and normally hearing persons, the problem intensifies. Only a negligible percentage of the non-deaf population is versed in sign language. Thus, some deaf people read lips and utter words similar enough in their vocal resemblance to enable them to be understood. Beyond this tedious and taxing effort, there is virtually no form for such communication except exchanging some written notes or having an interpreter involved.

A number of methods as to how to achieve sign recognition have been proposed in the literature. However, in spite of the apparent detail of such articles, they do not go beyond general suggestions, which fail when tested against the development of enabling technology. Major problems have been impeding the success of such enabling technology.

The Kurokawa et al article entitled "Bi-Directional Transmission Between Sign Language And Japanese For Communication With Deaf-Mute People" Proceedings of the 5th International Conference on Human Computer Interaction, 2, 1109 (1993) described how limited recognition can be achieved of static gestures utilizing electromechanical gloves which are sensor based and Kurokawa digitizes the electromechanical output of sensors. Capturing images with a camera is a well known art, but interpreting such images in a consistent way without relying on the human brain for direct interpretation (i.e., machine interpreted images) has alluded researches. The Rogers article entitled "Proceedings SPIE-The International Society For Optical Engineering: Applications of Artificial Neural Networks", IV, 589 (1993), suggests various approaches which cannot work when tested in a real life situation, such as utilizing infrared for signal interpretation. Unfortunately, one cannot combine the technology of Rogers and Kurokawa to solve the problem because the technologies employed are mutually exclusive. If one uses images as Rogers proposes, one cannot obtain from them the information provided by the sensors of the data gloves of Kurokawa; if one uses Kurokawa's gloves, one cannot utilize the camera images to provide any intelligence, knowledge or information beyond what the sensors in the DataGloves provide. Therefore, a fresh approach to the problem is necessary.

Displaying signed motions presents another challenge. A simple database of all possible signed motions which is an intuitive approach is rather problematic. To create a lucid signing stream, one needs a smooth movement from one word or phrase to another. Otherwise, the signing is jerky at best if not totally unintelligible. Although there may have been suggestions for such a database of signing images, this is not a realistic resolution due to the fact that, for every signed image in the database, one will need to have an enormous amount of connecting movements to other potential gestures, increasing dramatically the size of the database. To select a signing stream, inclusive of all the proper intermediary connecting gestures between previous and current images needed for lucid signing presentation, from such

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A further object is to provide a unique method utilizing such an electronic communication system to enable communication by and to deaf persons.

There is included means for translating speech into digital data representing words and phrases and such digital data into digitized signing motions. Desirably, the video apparatus includes a display screen to provide an output of the digitized motions as signing motions on the display screen for viewing by the deaf person. The video apparatus also includes a microphone and speaker whereby a deaf person may communicate with another person in the immediate vicinity.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic presentation of the steps performed in an electronic communication system embodying the present invention:

FIG. 2 is a schematic representation of a method for connecting an incoming call on the deaf person's telephone to a processing center providing the computer software for the translating functions of the present invention;

FIG. 3 is a schematic representation of the functions when utilizing such a processing center;

FIG. 4 is a schematic presentation of the several steps in the intervention and operation of the processing center when a call is received by the deaf person's telephone;

FIGS. 5a-5c are perspective views of a deaf person's receiver/transmitter installation embodying the present invention in three different forms using a personal computer and video camera, using a television set with a video camera, and as a public telephone kiosk;

FIG. 6 is a perspective view of the present invention in the form of a cellular telephone;

FIG. 7 is a schematic representation of artificial intelligence used to determine and translate the emotional content in the speech of a hearing person communicating with a deaf person;

FIG. 8 is a diagrammatic representation of the manner in which the screen of a display unit may be divided into sections presenting elements of information in addition to signing motions;

FIG. 9 is a schematic representation of the modules of the artificial intelligence for converting signing into speech;

FIG. 10 is a schematic representation of the modules for creating multiple neural networks and collecting the necessary examples for training these networks;

FIG. 11 is a schematic representation of the modules for controlling the conversion of text to signing animation;

FIG. 12 is a schematic representation of the modules for capturing and compressing the images to be used during the playback of sign language animation;

FIGS. 13 illustrates a user of the device wearing special gloves to enhance the ability of the system to identify the signing of the deaf person;

FIGS. 14a-14d illustrate the manner in which the unique shape of the glove makes it possible to recognize the differences between two very similar signs;

FIG. 15 is a schematic representation of the steps to effect translation of English text to American Sign Language (ASL); and

FIG. 16 is a schematic representation of the steps to effect translation of American Sign Language to English text.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning first to FIG. 1 of the attached drawings, therein illustrated schematically is an electronic communications system embodying the present invention.

Generally, the deaf person uses sign language in front of a device containing a video camera. The images captured by the camera at 20–30 frames/second are processed by a digital device which does initial and extended image processing. In the processing, each of the frames containing a captured image undergoes a process whereby the image is transformed into manageable identifiers. It is the set of identifiers, in the form of tables of numbers, that travels the

A portable transmitter/receiver generally designated by the numeral 8 for use by a deaf person is shown in FIG. 6 and it contains a video camera, the lens 10 of which is disposed in the upright portion 12. In the base portion 13 are an LCD display panel 14 and a key pad 16 for dialing and other functions. Also seen is an antenna 18 for the device so

The other party may speak into a telephone receiver (not shown) and the verbal expressions are translated by the artificial intelligence into digital data for signs. These signs are displayed on the LCD panel 14.

This is portrayed to the deaf either as a separate image in a corner of the screen which he or she is watching or incorporated into facial expressions of animated signing figures.

FIGS. 9-12 are schematics of the system software modules for converting signing to speech and speech to animation, including system training methods.

The deaf person uses sign language in front of the transmitter/receiver device containing the camera. The images captured by the camera are of the finger and hand motions and of body motions and of facial expressions and motions captured by a digital device which does initial processing. In the initial processing, each of the frames containing a captured image undergoes a process whereby the image is collapsed into a small set of fixed identifiers. At the end of the initial processing, the resulting information is sent as data on a regular and designated phone line using an internal modem in the device to the data processing center.

The normally hearing person who calls a deaf person dials the deaf person's phone number. However, at the deaf person's station, his or her call is connected to the center on a single line which is the deaf person's designated line to the

The normally hearing person's voice undergoes speech recognition in the center and is transformed into the equivalent signing content and then into textual material. The text is sent from the center to the deaf person's device via telephone lines. Software in the device converts the text into reduced identifying pointers for each gesture, which are then converted into animated images which portray in sign language the content of the speech processed in the center.

When the phone for the deaf is equipped with a microphone and a speaker instead of, or in addition to a second telephone channel, it may be turned into a communicator. Obviously, one can opt to have both of these options to double the usefulness of the device. The communicator enables the deaf person to conduct a "conversation" with any normally hearing person in the close proximity. The signing motion of the deaf person are processed by the center and is transmitted back to the device as a normal voice transmission which the speaker renders as speech to the normally hearing person. His or her speech in turn, is picked up by the microphone and sent to the center for processing. The result is an animated content on the LCD of the communicator which portrays in sign language the spoken content of the normally hearing person.

A person engaging in the development of other software should consider the following with respect to figure tracking:

a. Definitions:

$L(a) := \text{Left arm}$

R(h):=Right hand

R(a):=Right arm

$L(H)$:= Left side of the head

L(t):=Left tibia

$$G=R(t)+R(f)$$
$$PA=A+B$$

U(t):=Upper front teeth [showing=1; not showing=0]

In addition to the emotional content variable E_c , we analyze various combinations as they pertain to emotional expressions of a cultural group. For example:

Computer software for speech recognition and conversion to digital data presently exists and may be modified and enhanced for use in the communications system. Exemplary of such software is that of International Business Machines designated "IBM Continuous Speech Recognition Program". Similarly, commercial software may be used to convert digital data into artificial speech.

Algorithmic Steps

- a. Duplicate each incoming analog stream to provide two segments:
 1. An untouched segment (Segment A).
 2. A processed segment (Segment B).
- b. Tag each segment with respect to position in the incoming stream.
- c. Each segment (Segment A) can have variable length.
- d. Digitize incoming analog stream.
- e. operate speech recognition kernel on Segment B.
 - e.1. Speech recognition kernel.
 - e.2. Spell checker for word.
 - e.3. Grammatical checks.
 - e.4. If recognized and proper tag as Ra
If unrecognized or improper tag as Ua
- f. Tag each fully (i.e., 100%) recognized word as to its position in Segment B.
- g. Deduct the recognized words of Segment B in their appropriate position in Segment B from Segment A. The result is Segment C.
 - g.1. Segment C is tagged to identify its position in Segment A (Position 1).
- h. Segment C is inserted into a prepared digitized speech section (which contains a message to the speech originator)
- i. Digital to Analog conversion takes place.
- j. The resulting analog speech segment is sent to the speech originator.

Corrective Measures

- A. Topic Assisted/using Trap words
- B. Intermediary Agent Assisted
- C. Speaker Assisted.
- D. Spell Checker assistance.
- E. Grammatic Assistance.

1. Invoking the most common nine words to decide:

1.b. Channel to subgroup section [divided into geographic and demographic (cultural) groups]

3. Utilize B-tree [C++, V4+] for list of words possibly matching word in question.

1. This level utilizes trap words in order to determine personal speech patterns.

Values of $n(a)$ or $n(b)$ can be modified per specific situation.

i determines the group most appropriate to determine any of the nine words.

$$S = \sum_{i=1}^9 \text{Word}[i] = 9$$

1. This level trans words to determine area of discussion.

$j=1, \dots, 10$ i.e. Ten words for each area of concentration

$k=1, \dots, 12$ i.e. Twelve areas of concentration

$$S(j, k) = \sum_{i=1}^{10} \sum_{k=1}^{12} \text{Word}[j, k] = 120$$

1. This level compares unrecognized words against groups of 20 words describing each of the 12 areas.

$$S(i, j, k, l) =$$

$$\sum_{i=1}^9 \sum_{j=1}^{10} \sum_{k=1}^{12} \sum_{l=1}^{20} \text{Word}[i, j, k, l] = 9 \times 10 \cdot 12 \cdot 20 = 21,600 \text{ words}$$

If the signer uses American Sign Language, there is a need to effect linguistic analysis beyond what was recognized by William Stokoe in *Semantics and Human Sign Language*, Mouton (1971), and *Sign Language Structure*, Linstok Press (1978).

ASL is a visual-spatial language requiring simultaneous, multiple, dynamic articulations. At any particular instant, one has to combine information about the handshape (Stokoe's *dez*), the motion (Stokoe's *sig*) and the spatial location of the hands relative to the rest of the body (Stokoe's *tab*). Supplementing such information and by dynamically articulating a word or a meaning, are grammatical cues provided in context and requiring attention to detail.

Cultural issues require attention right from the outset. The ASL finger spelled letter "T" viewed in Europe, or ASL signs spatially located relative to the person's midsection viewed in China, will be locally construed a pejorative. Hence, identification of the expression in the context of the intended recipient, may cause the format of delivery to undergo an appropriate substitution. Therefore, the algorithms as related to telephone communication, try to identify the recipient's cultural base or geography prior to dispatch, so that the algorithmic routines for appropriate adjustments can be invoked.

As will be appreciated, there is a substantial problem in effectuating real time transmission of the data as to images because of the need for compression even after discarding superfluous information. If we consider a video camera with 640 horizontal pixels and 480 lines, this means that a single frame amounts to 307,200 Bytes or 2.4576 Mbits. When considering a real time operation of 30-frames/sec, this would require 73.728 Mbits/Sec. Obviously, a bottleneck will result in the transfer to and from any acceptable storage media. Furthermore, to utilize telephone lines in a meaningful way, such as at 56 kilobits/second or even at 64 kilobits/second, it would take close to 20 minutes to transfer one second of video data. Using compression would mean a compression rate of over 1,000:1. Even resorting to compressing the data by utilizing wavelets, the level of resulting quality would be questionable. The other alternative is typically to transmit fewer frames per second, but this is an unacceptable method as it results in jerky motions and becomes difficult to interpret visual signing gestures.

It will be appreciated that another significant aspect of the invention is the requirement that finger spelling be captured by the camera, undergo the RDS process, and still be recognized once artificial intelligence procedures are invoked. This task can be difficult because the frame grabber has to capture the signed gesture against the ambient surroundings, other body parts of the signing person, and clothes. Preferably, the system uses special gloves which allow discrimination of the hands from the background for the image processing system.

The same type of RDS is utilized in recreating images, frame by frame, in real time, which will be displayed on the deaf person's monitor. These images will appear as smooth, continuous animation which will be easy to recognize. This is because the recreation of this animation is a result of actual frame by frame information which has been captured from a live subject and put into memory. The RDS takes up minimal memory and yet is completely on demand, interactive, and operates at real time speed.

At the end of the speech recognition, from the hearing persons' voice and text building procedure, the various words will be assembled into their counterpart animated signing gestures, starting with the table of data generated from the text that was transmitted from the center doing the frame by frame recreation for each gesture, employing

[illegible]

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2
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[illegible]

- [illegible]

[illegible][illegible]

- (a) visually observing the images of facial and hand and finger signing motions of a deaf person and converting the observed signing motions into digital identifiers;
- (b) translating said digital identifiers of said observed signing motions into words and phrases;
- (c) outputting said words and phrases in a comprehensible form to another person;
- (d) receiving speech from said another person;
- (e) translating said speech of said another person into signing motions; and
- (f) displaying said signing motions representing said speech to said deaf person.

14. The electronic communication method in accordance with claim 13 wherein said step of outputting at a remote location is effected by transmission of said translated words and phrases to a communications device receiver at said remote location.

16. The electronic communication method in accordance with claim 12 including the step of transmitting said digital identifiers of said motions and said speech electronically to a central station where said translating steps are performed.

18. The electronic communication method in accordance with claim 12 wherein said outputting step provides said words and phrases in written form to said another person.

20. The electronic communication method in accordance with claim 12 wherein said translating step utilizes artificial intelligence.

22. The electronic communication method in accordance with claim 12 wherein said another person and said displaying step are at the same location as said deaf person and wherein said visually observing and converting step utilizes a video apparatus.

24. The electronic communication method in accordance with claim 22 wherein said translating steps are conducted at a remote center.

25. The electronic communication method in accordance with claim 12 wherein said translating steps are conducted at a remote center.

- (a) a video apparatus for visually observing the images of facial and hand and finger signing motions of a deaf person and converting the observed signing motions into digital identifiers;
- (b) means for translating said digital identifiers of said observed signing motions into words and phrases;
- (c) means for outputting said words and phrases generated by the visual observations of said signing motions in a comprehensible form to another person;
- (d) a receiver for receiving spoken words and phrases of another person and transmitting them;
- (e) means for translating said spoken words and phrases into signing motions which may be observed by the deaf person; and
- (f) means for outputting said signing motions on said video apparatus for viewing by the deaf person, said translating means being located at a central station with which said video apparatus and receiver are in communication.

28. An electronic communications system for the deaf in accordance with claim 26 wherein said video apparatus includes a video camera and image capture and processing hardware and software.

30. An electronic communications system for the deaf in accordance with claim 28 wherein said outputting means converts said coherent sentences into synthetic speech.

32. An electronic communications system for the deaf in accordance with claim 26 wherein said video apparatus includes a display screen to provide an output of said spoken words and phrases as signing motions on said display screen for viewing by the deaf person, and wherein said video apparatus includes a microphone and speaker whereby a deaf person may communicate with another person in the immediate vicinity.

* * * * *

ABSTRACT OF THE DISCLOSURE

An electronic communications system for the deaf includes a video apparatus for observing and digitizing the facial, body and hand and finger signing motions of a deaf person, an electronic translator for translating the digitized signing motions into words and phrases, and an electronic output for the words and phrases. The video apparatus desirably includes both a video camera and a video display which will display signing motions provided by translating spoken words of a hearing person into digitized images. The system may function as a translator by outputting the translated words and phrases as synthetic speech at the deaf person's location for another person at that location, and that person's speech may be picked up, translated, and displayed as signing motions on a display in the video apparatus.

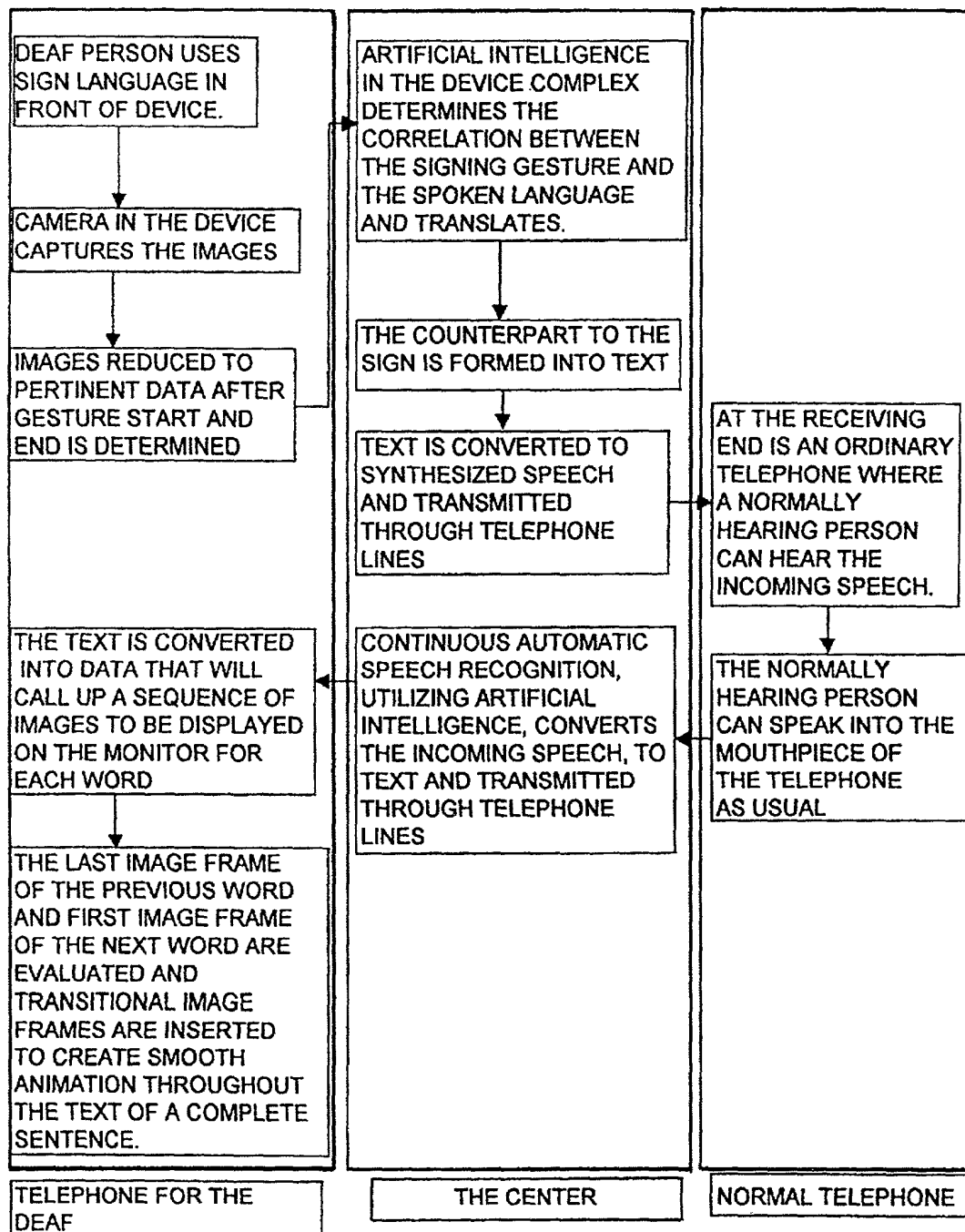
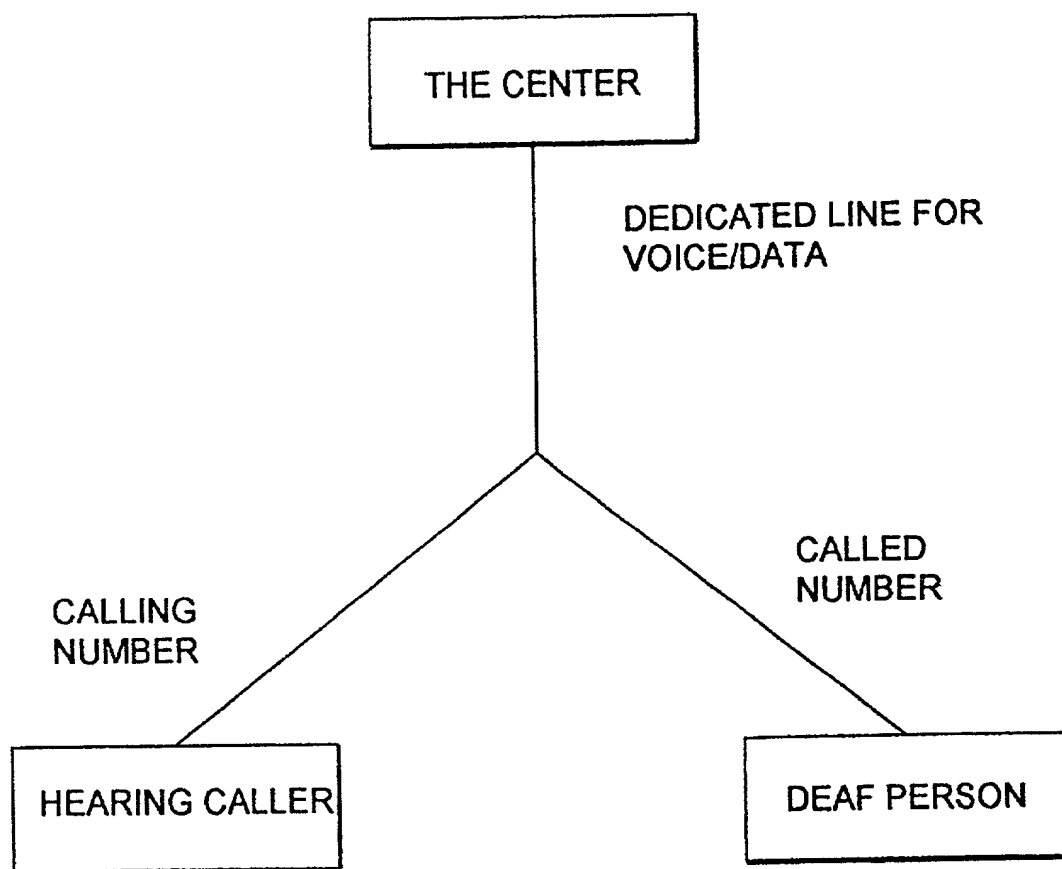


FIG. 1

*FIG. 2*

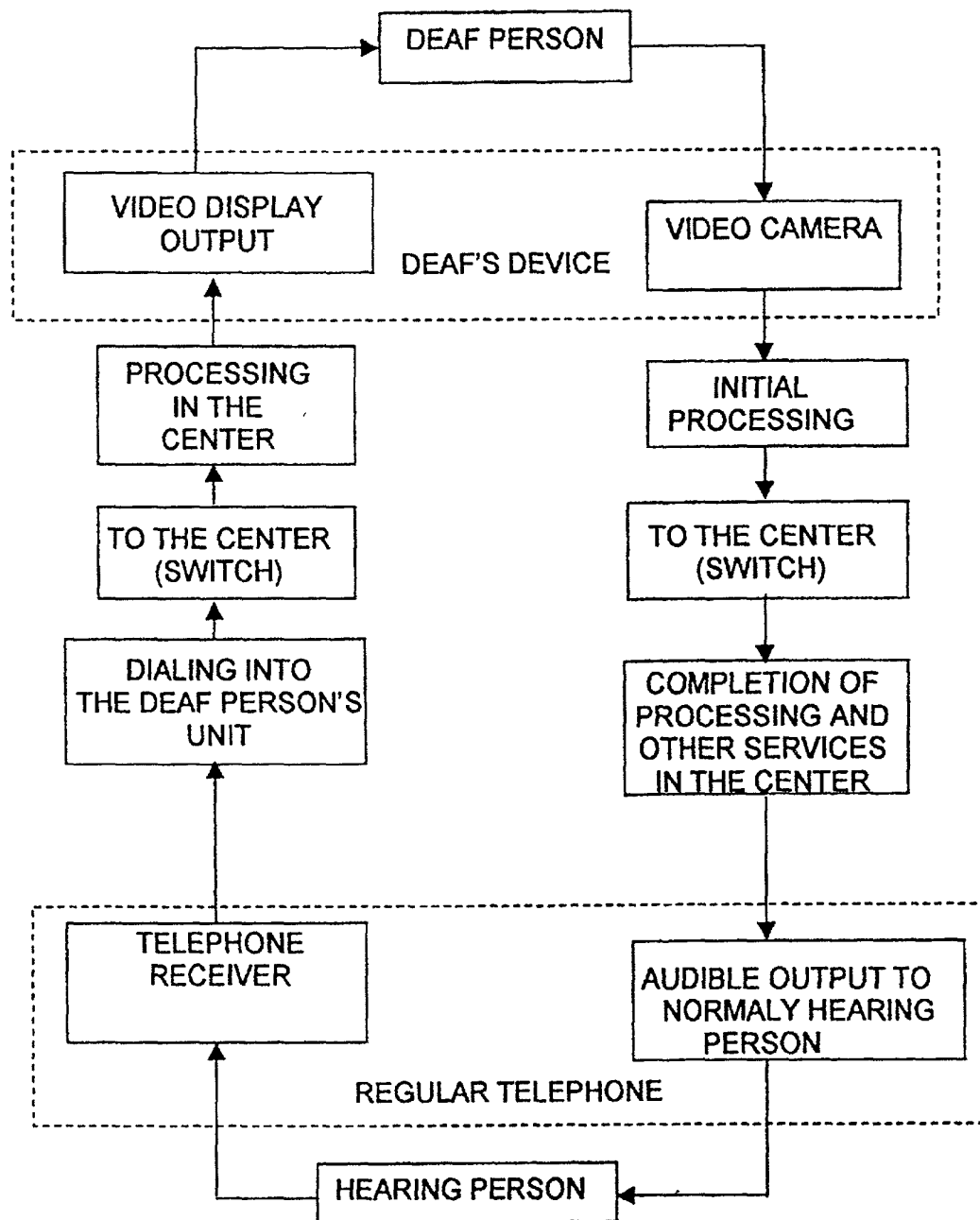


FIG. 3

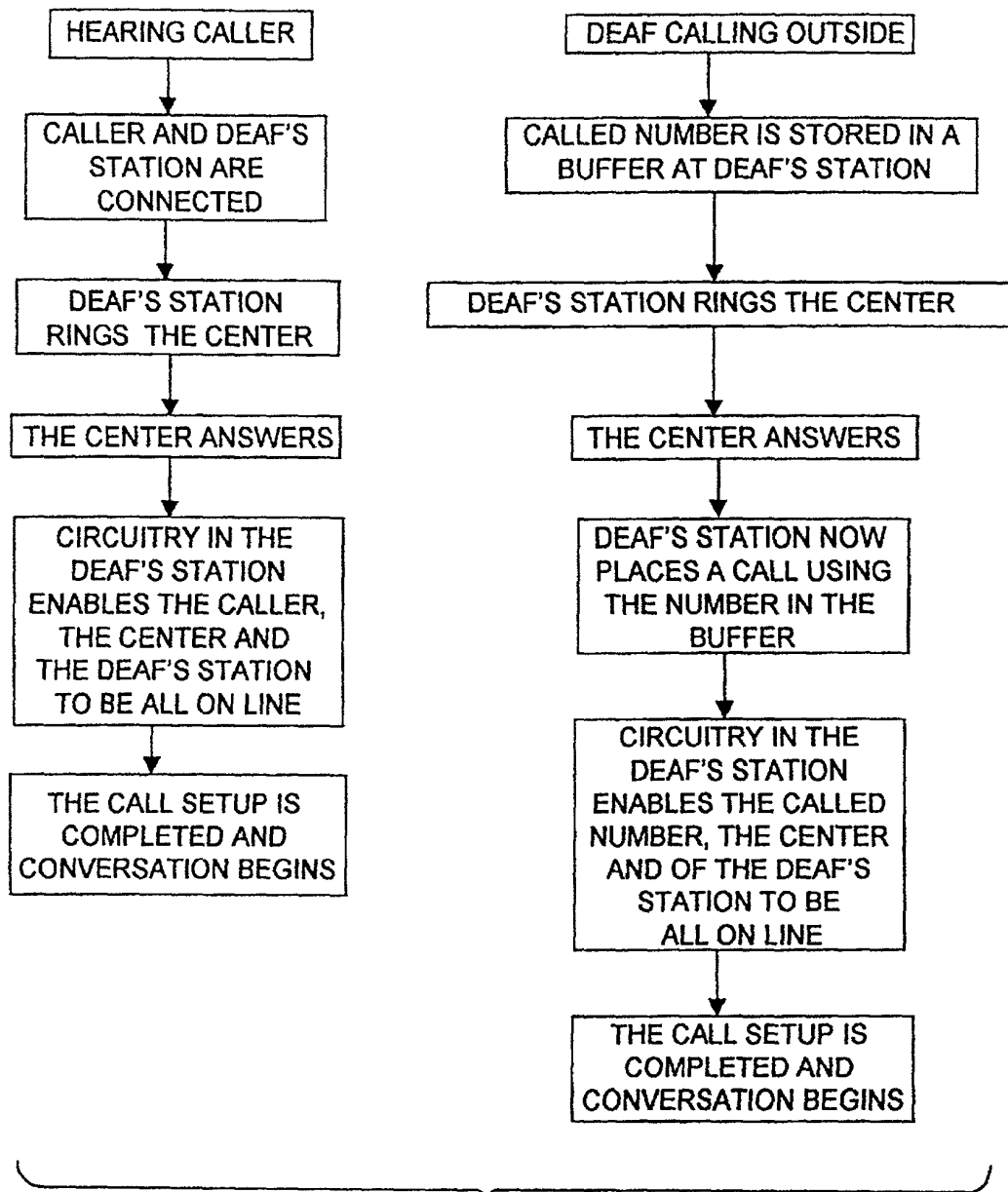


FIG. 4

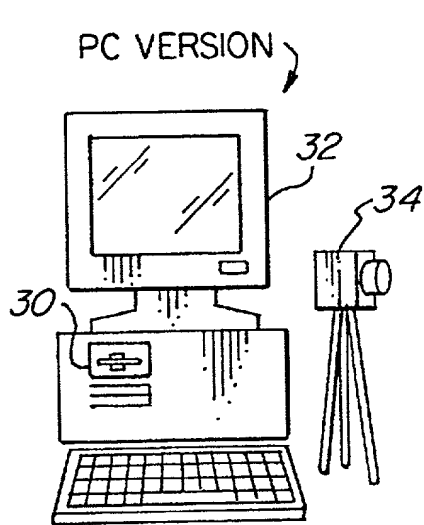


FIG. 5A

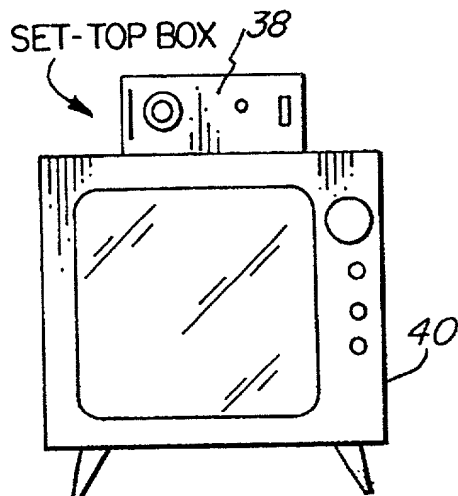


FIG. 5B

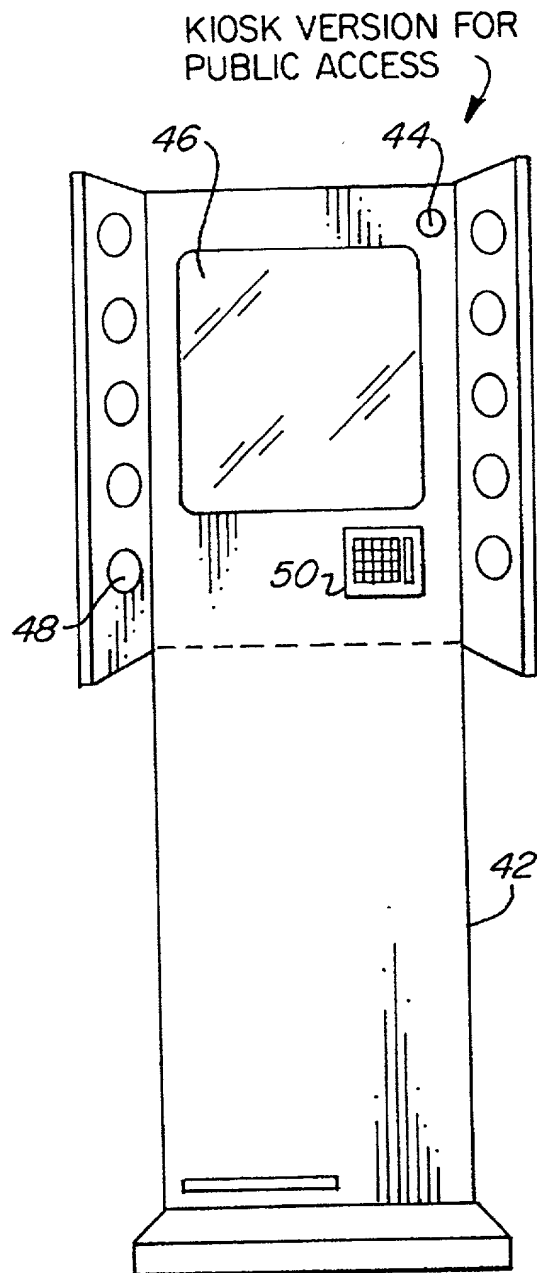
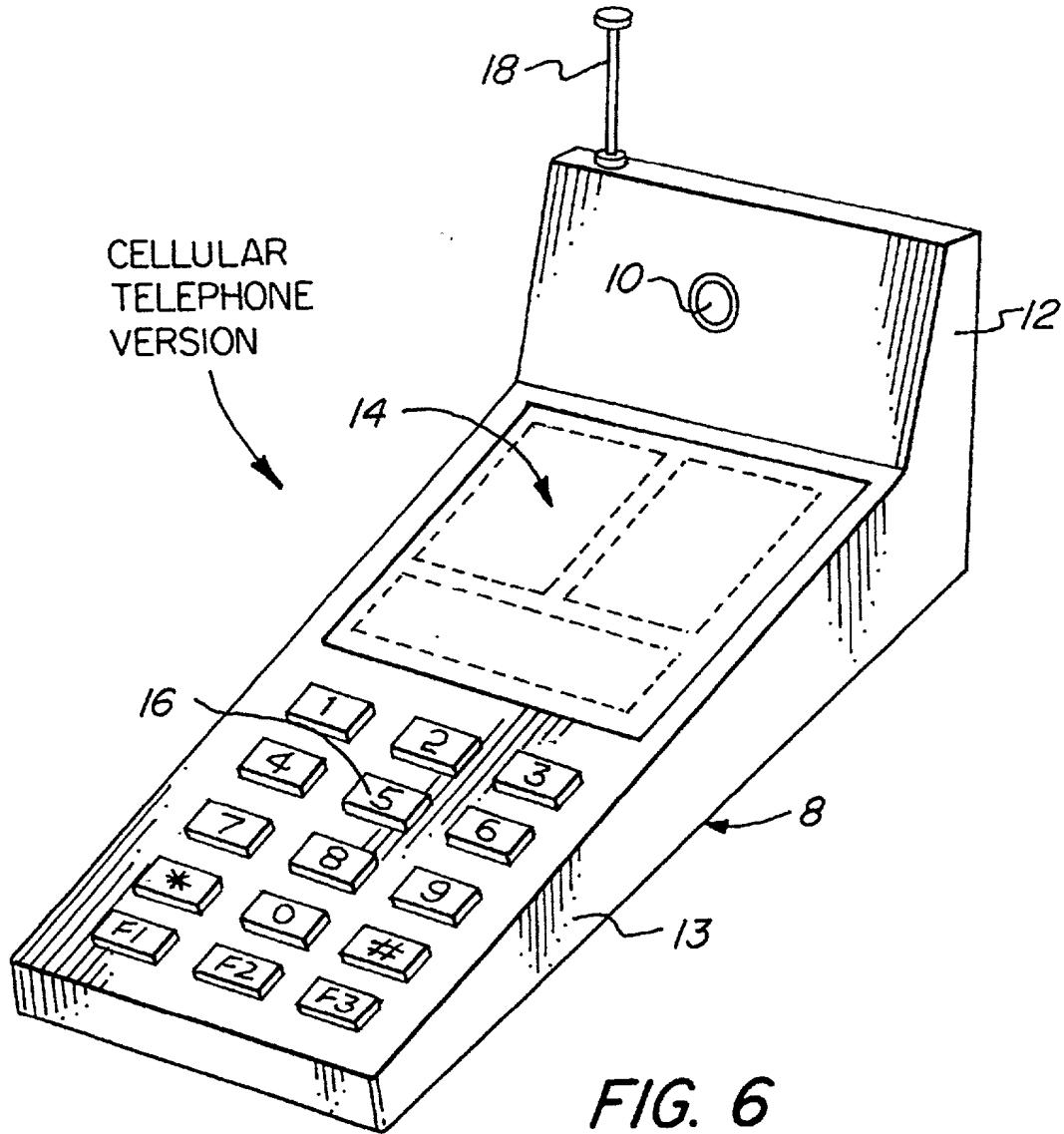


FIG. 5C



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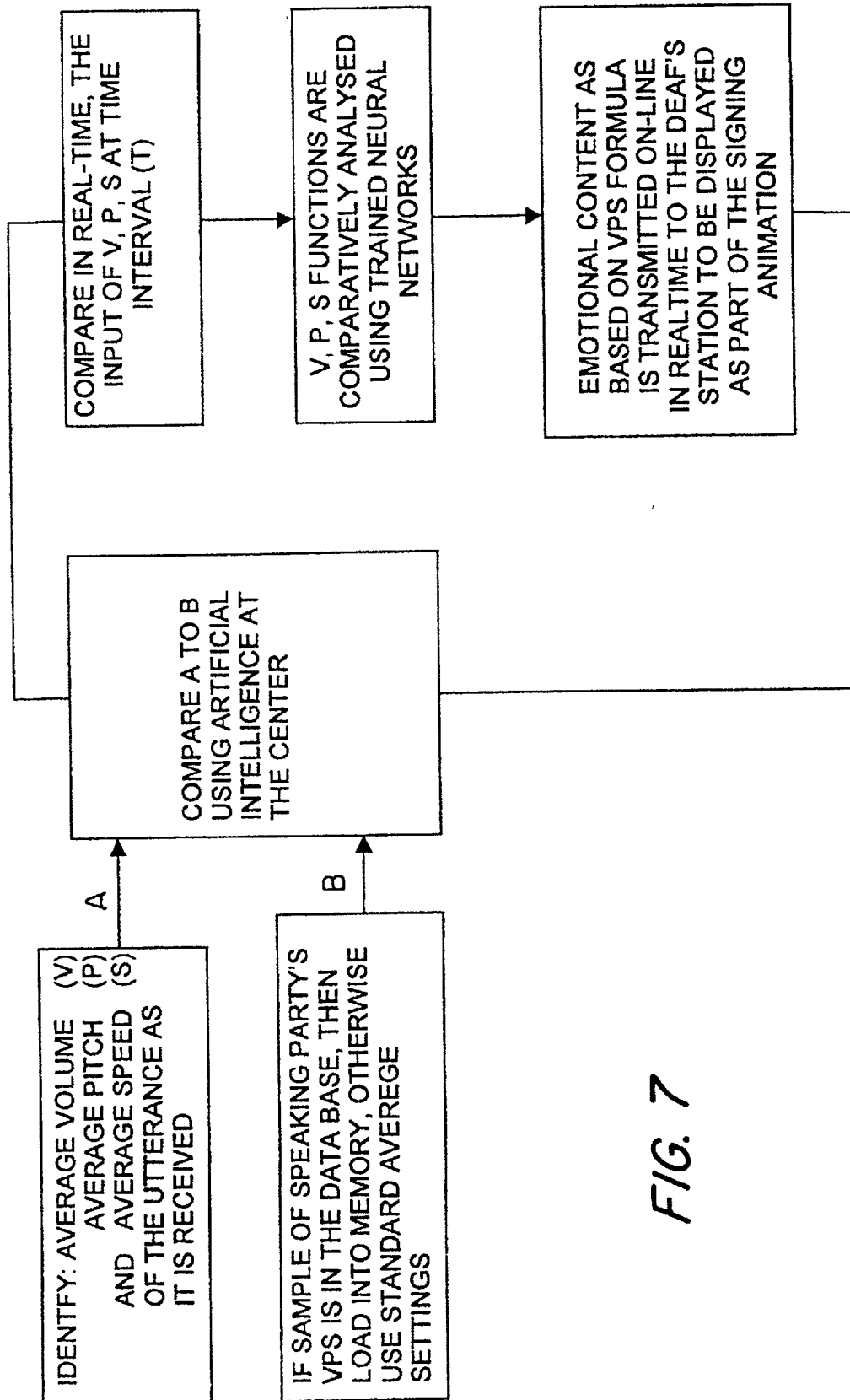
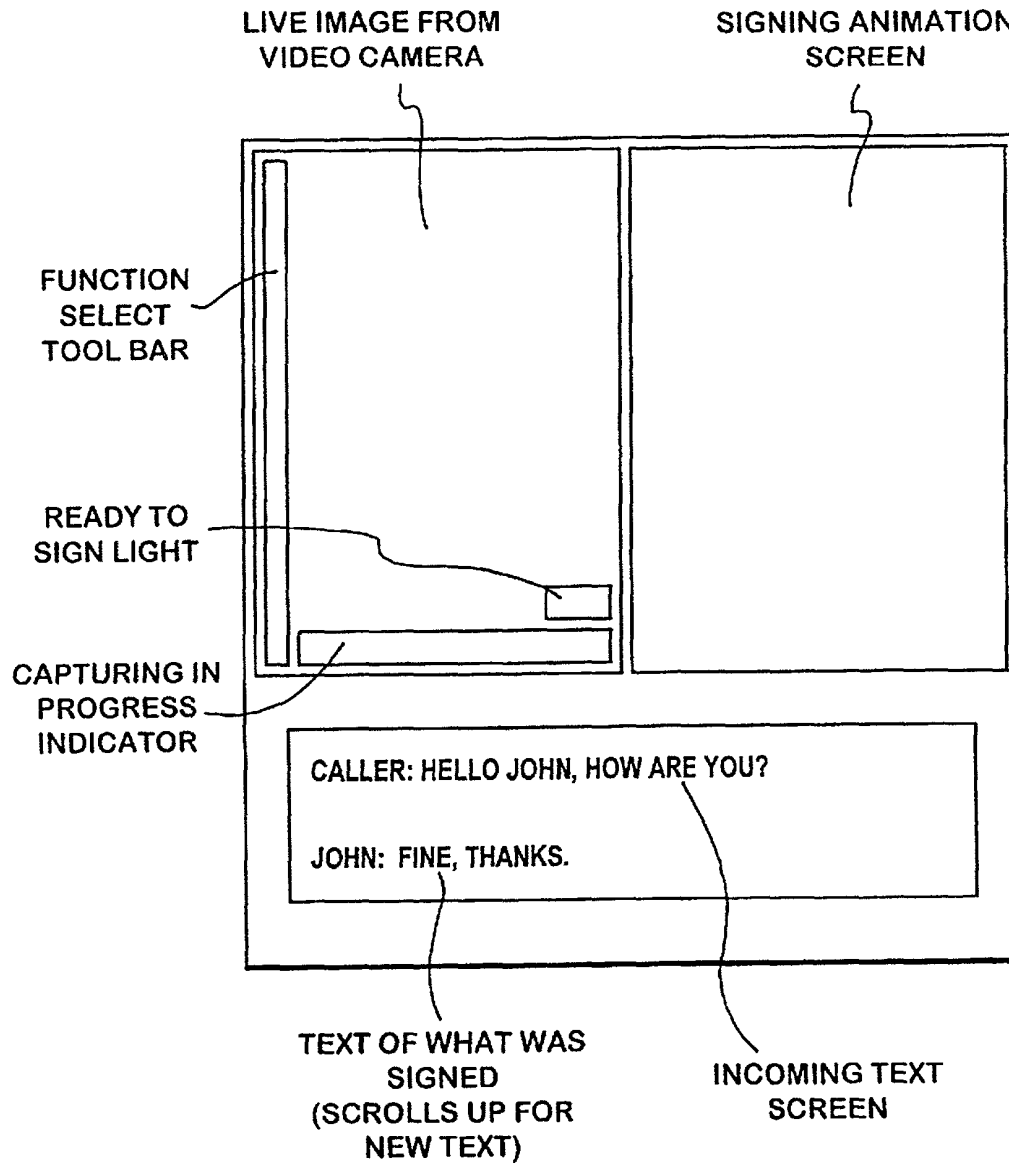


FIG. 7



TELEPHONE FOR THE DEAF VIDEO MONITOR SCREEN LAYOUT

FIG. 8

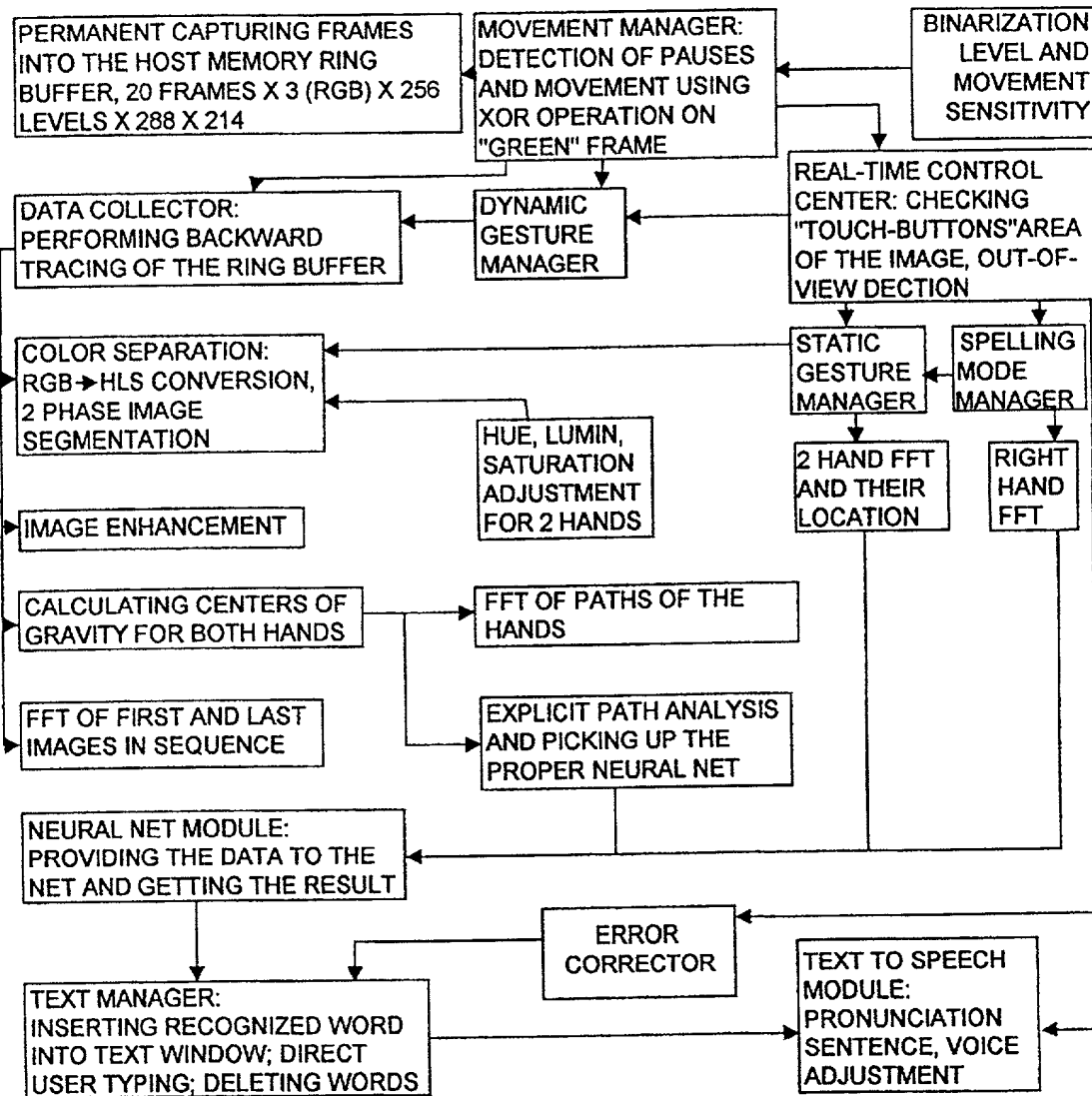


FIG. 9

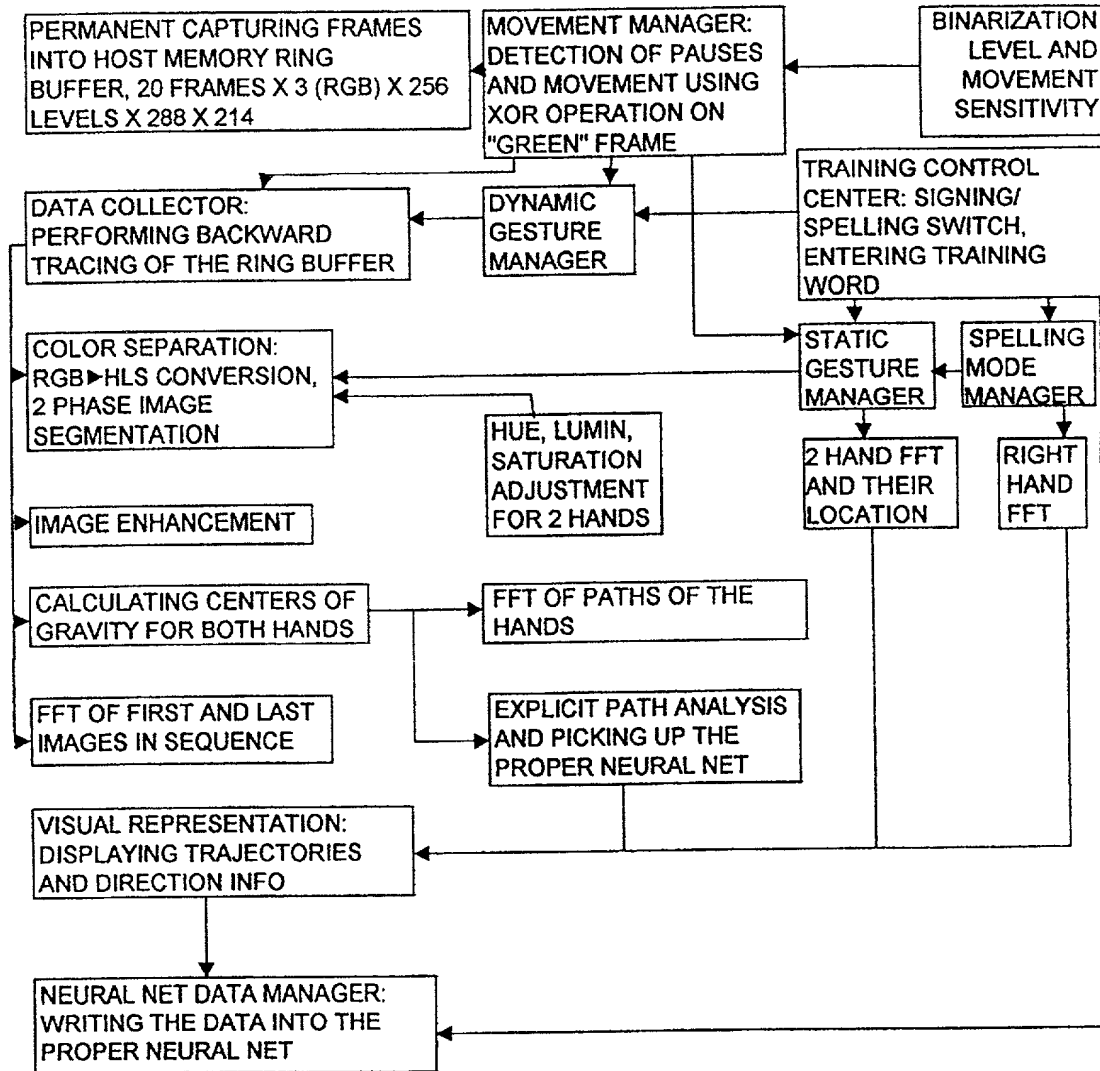


FIG. 10

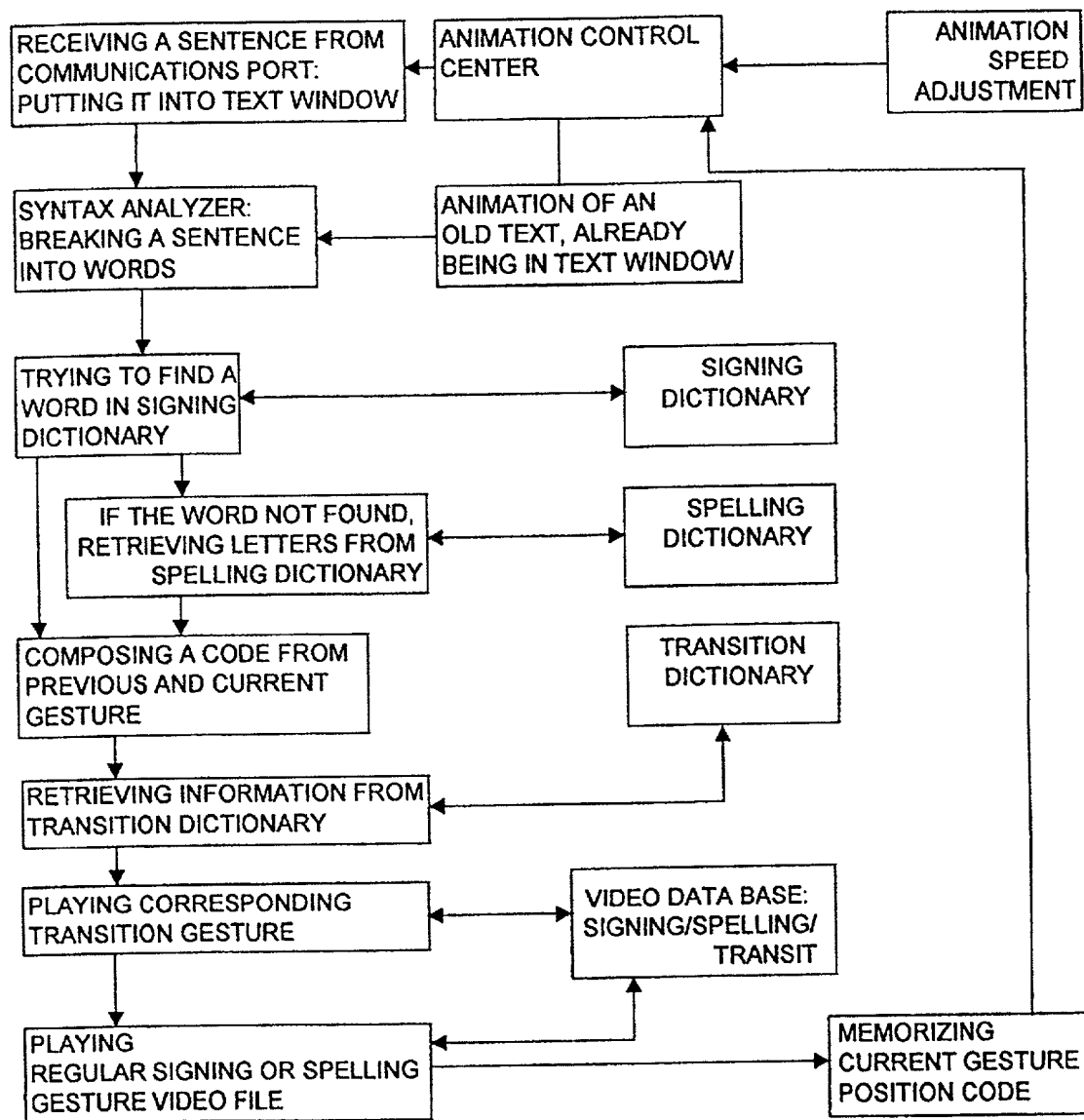


FIG. 11

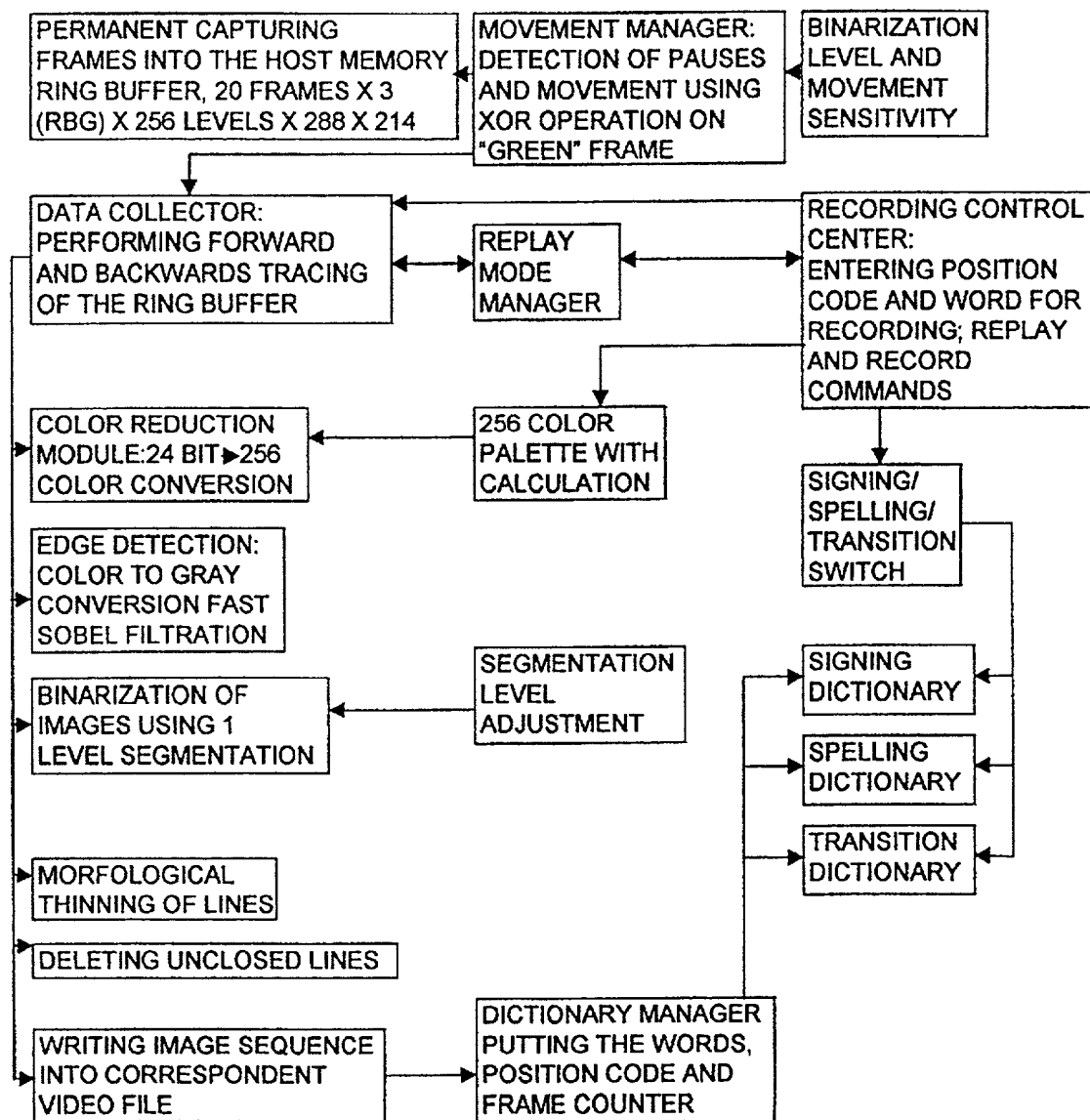


FIG. 12

SHAPE OF GLOVES,
BACK

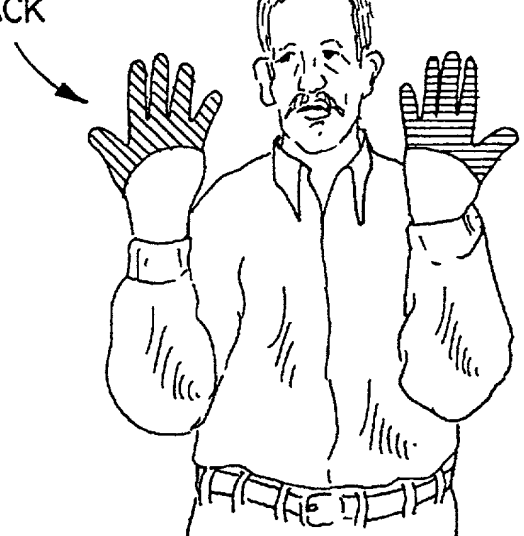
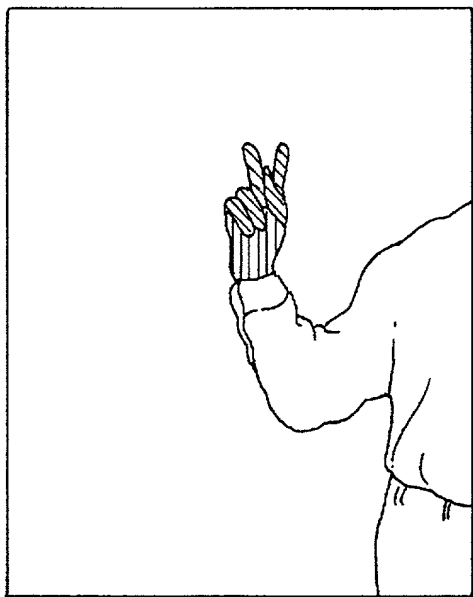
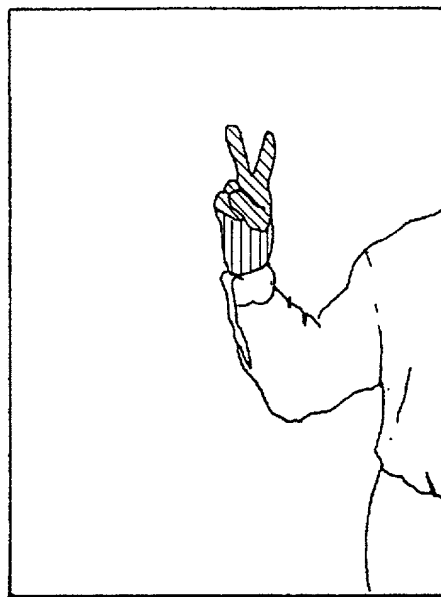


FIG. 13B



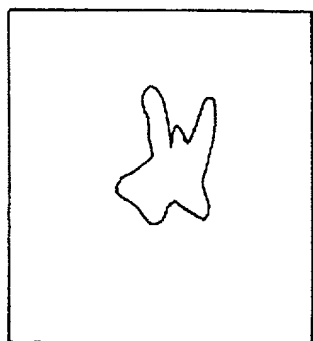
SIGN FOR LETTER "K"
FULL IMAGE

FIG. 14A



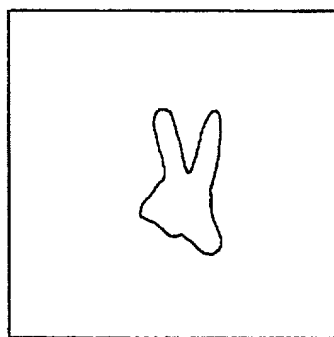
SIGN FOR LETTER "V"
FULL IMAGE

FIG. 14B



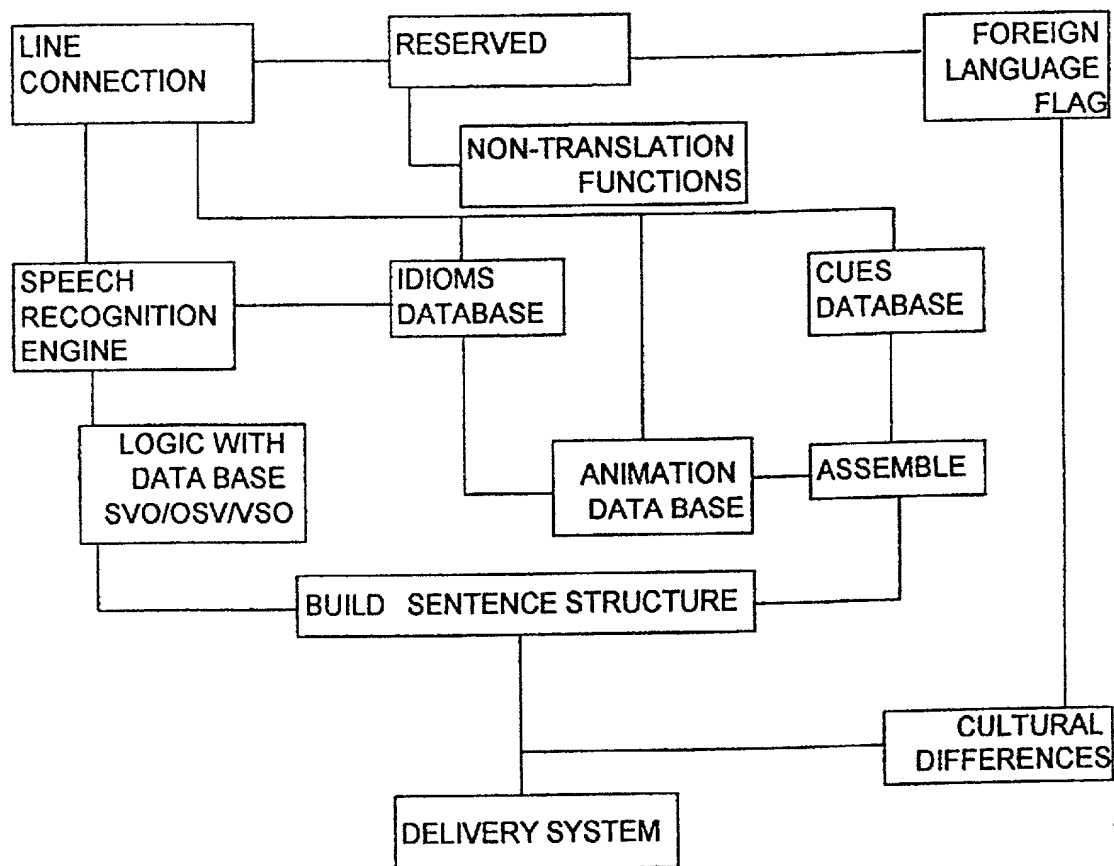
THE SIGN FOR LETTER "K"
BINARY IMAGE

FIG. 14C



THE SIGN FOR LETTER "V"
BINARY IMAGE

FIG. 14D

*FIG. 15*

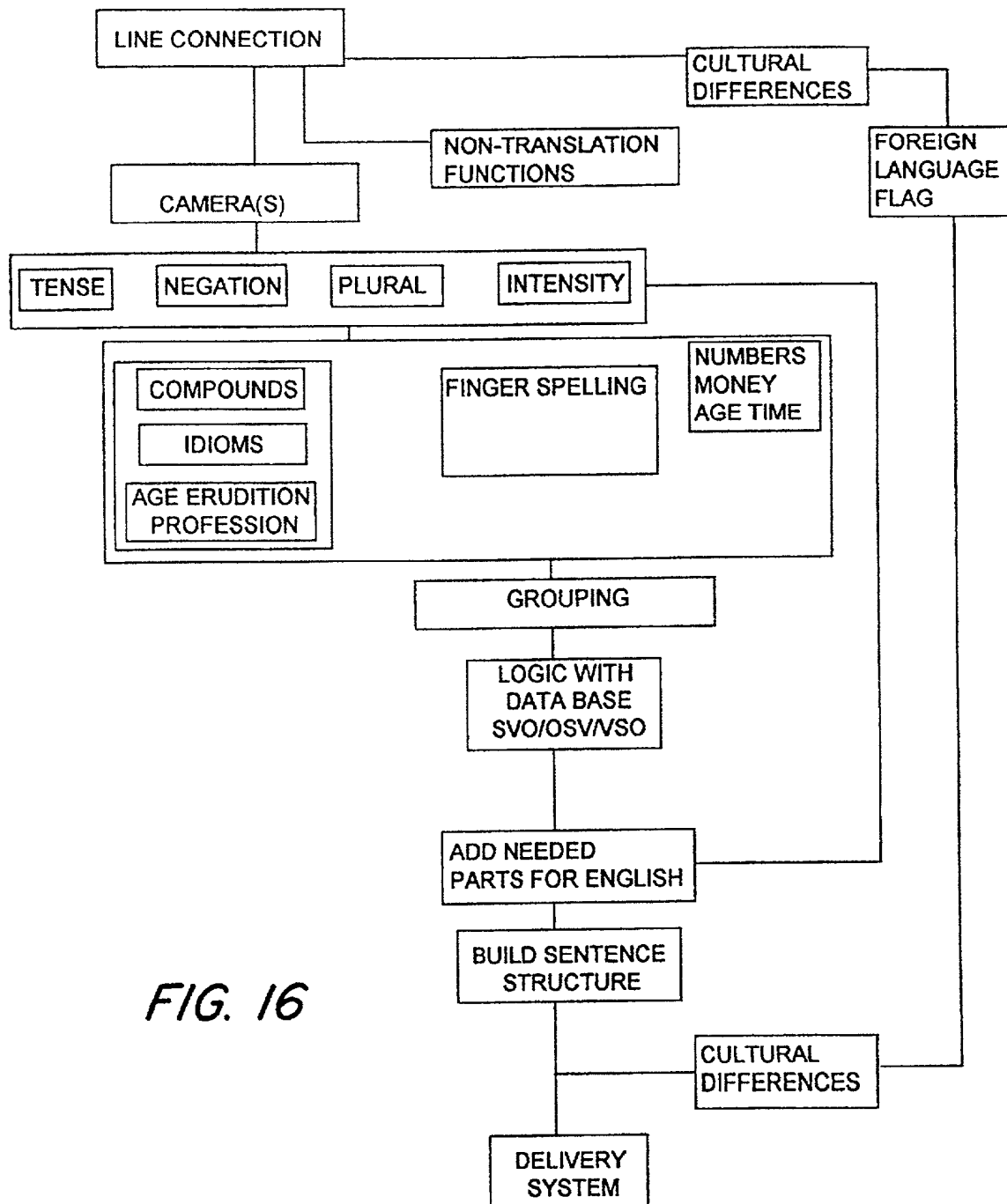


FIG. 16

Practitioner's Docket No. 00-422RE**PATENT****REISSUE APPLICATION DECLARATION AND POWER OF ATTORNEY
(BY INVENTOR(S) OR ASSIGNEE)**

(complete A or B)

A. ☒ DECLARATION BY THE INVENTOR(S)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name, I believe I am the original, first and sole inventor (*if only one name is listed below*) or an original, first and joint inventor (*if plural names are listed below*) of the subject matter that is described and claimed in letters patent number 5,982,853, granted on November 9, 1999, and for which invention I solicit a reissue patent on the invention entitled TELEPHONE FOR THE DEAF AND METHOD OF USING SAME

the specification of which

☒ is attached hereto.☐ was filed on _____, as reissue application number / and was amended on _____ (*if applicable*).☐ I hereby declare that there is no assignee for this application.

NOTE: "Where no assignee exists, applicant should affirmatively state that fact. If the file record is silent as to the existence of an assignee, it will be presumed that no assignee exists." M.P.E.P., 6th ed., rev. 1, § 1410.01.

B. ☐ DECLARATION BY ASSIGNEE

NOTE: The assignee of the entire interest may make the declaration, if the reissue application does not seek to enlarge the scope of the claims of the original patent. 37 C.F.R. § 1.172.

(type or print name of declarant)

Title

of _____

Name of company or legal entity on whose behalf declarant is authorized to sign

declare that I am a citizen of _____ and resident of _____,

_____, that the entire title to letters patent number _____,

for _____,

granted on _____, 19____ to _____

Inventor(s)

is vested in _____

Name of company or legal entity

that I believe said named inventor(s) to be an original, first and sole inventor (*if only one name is listed*) or an original, first and part inventor (*if plural names are listed*) of the subject matter that is described and claimed in the aforesaid letters patent and in the foregoing specification and for which invention I solicit a reissue patent.

00603247 062200

ACKNOWLEDGEMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR
(37 C.F.R. § 1.175)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information that is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

- ☒ In compliance with this duty, there is attached an information disclosure statement in accordance with 37 C.F.R. § 1.98.

PRIORITY CLAIM

NOTE: A "claim" for the benefit of an earlier filing date in a foreign country under 35 U.S.C. 119(a)-(d) must be made in a reissue application even though such a claim was made in the application on which the original was granted. However, no additional certified copy of the foreign application is necessary. M.P.E.P., 6th ed., rev. 1, § 1417.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

(complete C or D)

- C. ☒ No such applications have been filed.
D. ☐ Such applications have been filed as follows:

**EARLIEST FOREIGN APPLICATION(S), IF ANY FILED WITHIN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO SAID APPLICATION**

Country	Application No.	Date of filing (day, month, year)	Date of issue (day, month, year)	Priority Claimed
				<input type="checkbox"/> YES NO <input type="checkbox"/>
				<input type="checkbox"/> YES NO <input type="checkbox"/>
				<input type="checkbox"/> YES NO <input type="checkbox"/>

**ALL FOREIGN APPLICATION(S), IF ANY FILED MORE THAN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO SAID APPLICATION**

BENEFIT OF PROVISIONAL APPLICATION

(Reissue Application Declaration and Power of Attorney [17-6]—page 2 of 6)

00603247 062300

**STATEMENT OF INOPERATIVENESS
OR INVALIDITY OF ORIGINAL PATENT**
(37 C.F.R. § 1.175)

That I believe the original patent to be

- ☒ partly
☐ wholly

inoperative or invalid by reason of (37 C.F.R. § 1.175(a)(1)):

(check all items that may apply)

- ☐ a defective specification
☐ a defective drawing
☒ the patentee claiming more or less than the patentee had a right to claim in the patent.

NOTE: At least one error must be relied upon as the basis for the reissue. 37 C.F.R. § 1.175(a)(1).

That the error listed above, which are being corrected, up to the time of the filing of this reissue declaration arose without any deceptive intention on the part of the applicant. (37 C.F.R. § 1.175(a)(2)).

NOTE: For any error corrected not covered by this declaration applicant must submit, before allowance, a supplemental declaration stating that every such error arose without any deceptive intention on the part of the applicant. 37 C.F.R. § 1.175(b)(1).

- ☐ Corroborating affidavits or declarations of others accompany this declaration.

THAT, in particular, in claim 1, lines 3-6, it is now stated that there is "a video apparatus for visually observing the images of facial and hand and finger signing motions of a deaf person...", whereas the video apparatus may visually observe the images of facial and hand and finger signing motions of any person. The same defect appears in claim 12, lines 3-4 and claim 26, lines 3-5. This error arose when the claims were originally drafted and were due by a failure of Applicant and his then attorney to appreciate the full scope of the invention.

(CONTINUED ON ADDED PAGES):

(Reissue Application Declaration and Power of Attorney [17-6]—page 3 of 6)

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POWER OF ATTORNEY

I hereby appoint the following practitioner(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

(list name and registration number)

Robert H. Bachman (19,374), Gregory P. LaPointe (28,395), Barry L. Kelmachter (29,999), and George A. Coury (34,309), all of Bachman & LaPointe, P.C., 900 Chapel Street, Suite 1201, New Haven, CT 06510-2802

(check the following item, if applicable)

- ☒ I hereby appoint the practitioner(s) associated with the Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.
- ☐ Attached, as part of this declaration and power of attorney, is the authorization of the above-named practitioner(s) to accept and follow instructions from my representative(s).

SEND CORRESPONDENCE TO

- ☒ **Address**
Bachman & LaPointe, P.C.
900 Chapel Street, Suite 1201
New Haven, CT 06510-2802

DIRECT TELEPHONE CALLS TO:
(Name and telephone number)

Barry L. Kelmachter
(203) 777-6628 - ext. 114

- ☐ **Customer Number** _____

(Reissue Application Declaration and Power of Attorney [17-6]—page 4 of 6)

STATEMENT BY ASSIGNEE

- ☐ Attached is a "STATEMENT UNDER 37 C.F.R. 3.73(b)," establishing the right of the assignee to take action in this reissue.

Signature of assignee or person authorized to
sign on behalf of assignee

(check proper box(es) for any added page(s) forming a part of this declaration)

- ☐ Signature for third and subsequent joint inventors. Number of pages added. _____
- ☐ Signature by administrator(trix), executor(trix) or legal representative for deceased or incapacitated inventor. Number of pages added. _____
- ☐ Signature for inventor who refuses to sign or cannot be reached by person authorized under 37 C.F.R. § 1.47. Number of pages added. _____
- ☒ Statement of inoperativeness or invalidity of original patent. 37 C.F.R. § 1.175. Number of pages added 2.
- ☐ Authorization of attorney(s) to accept and follow instructions from representative.
- ☐ Corroborating statements of others.

(Reissue Application Declaration and Power of Attorney [17-6]—page 6 of 6)

**REISSUE APPLICATION DECLARATION AND POWER OF ATTORNEY
(BY INVENTOR(S) OR ASSIGNEE)**

ADDED PAGE

**STATEMENT OF INOPERATIVENESS
OR INVALIDITY OF ORIGINAL PATENT
(37 C.F.R. § 1.175)**

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FURTHER THAT, the system claims in the patent are defective in that they are unduly narrow by virtue of the limitations in claim 1, lines 3-6 and in claim 26, lines 3-5 to the video apparatus. System claims 1 and 26 do not adequately address how spoken communications are processed for receipt by a hearing impaired person and how a hearing impaired person can respond to same. New claim 33 is intended to correct this defect. In particular, new claim 33 states that the translating means includes "means for transforming...spoken words into equivalent signing content and then into textual material" and that the outputting means outputs "said textual material for display on a device utilized by said hearing impaired person". With regard to how the hearing impaired person responds, new claim 33 states that the transforming means convert words and phrases from the hearing impaired person into a form which may be presented to a hearing person. Basis for new claim 33 can be found in that portion of the specification beginning in column 4, line 60 and ending in column 5, line 34 and in that portion in column 7, lines 10-17.

(Reissue Application Declaration and Power of Attorney [17-6] _____ Added page 1)

**REISSUE APPLICATION DECLARATION AND POWER OF ATTORNEY
(BY INVENTOR(S) OR ASSIGNEE)**

ADDED PAGE
**STATEMENT OF INOPERATIVENESS
OR INVALIDITY OF ORIGINAL PATENT
(37 C.F.R. § 1.175)**

Claims 34-45 depend from claim 33 and are directed to further details of the system of claim 33. Support for these claims can be found in the aforementioned portions of the specification as well as in that portion from column 5, line 35 to column 6, line 25 of the patent.

The errors which claims 33-45 correct arose when the claims of the patent were originally drafted and prosecuted due to a failure of Applicant and his then attorney to appreciate the full scope of the invention.

The foregoing errors/defects were discovered by Attorney Barry L. Kelmachter after completing a review of the file history of U.S. Patent No. 5,982,853 and the cited references in May, 2000. The errors/defects were immediately brought to Applicant's attention by Attorney Kelmachter and preparation of the instant reissue application commenced.

The foregoing errors/defects arose without any deceptive intent on the part of Applicant.

(Reissue Application Declaration and Power of Attorney [17-6] _____ Added page 2)

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Burden Hour Statement. This form is estimated to take 0.1 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO Assistant Commissioner for Patents, Washington, DC 20231.

PATENT

Attorney's Docket No. 00-422RE

Applicant or Patentee: RAANAN LIEBERMANN

Serial or Patent No.: 0 / _____

Filed or Issued: _____

For: TELEPHONE FOR THE DEAF AND METHOD OF USING SAME

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY
STATUS (37 CFR 1.9(f) and 1.27(b))—INDEPENDENT INVENTOR**

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled TELEPHONE FOR THE DEAF AND METHOD OF USING SAME described in

☒ the specification filed herewith.

☐ application serial no. 0 / _____, filed _____.

☐ patent no. _____, issued _____.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

☒ no such person, concern, or organization

☐ persons, concerns or organizations listed below*

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27).

FULL NAME _____

ADDRESS _____

☐ INDIVIDUAL

☐ SMALL BUSINESS CONCERN

☐ NONPROFIT ORGANIZATION

FULL NAME _____

ADDRESS _____

☐ INDIVIDUAL

☐ SMALL BUSINESS CONCERN

☐ NONPROFIT ORGANIZATION

FULL NAME _____

ADDRESS _____

☐ INDIVIDUAL

☐ SMALL BUSINESS CONCERN

☐ NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of pay-

ing, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Raanan Liebermann

Name of inventor

R. K.

Date

6-23-00

Signature of Inventor

Name of inventor

Date

Signature of Inventor

Name of inventor

Date

Signature of Inventor

Name of inventor

Date

Signature of Inventor

Name of inventor

Date

Signature of Inventor

Name of inventor

Date

Signature of Inventor